

## ABSTRACT

The present invention offers reflective color liquid crystal display devices with a high contrast ratio and eye-friendly multi-color display capability, and liquid crystal display devices incorporating a touch panel arranged therefrom, of which the display is not adversely affected by the installation of a pressure sensitive input device. In a reflective liquid crystal display device arranged from a light reflexible substrate (5) and a substrate (4); a liquid crystal layer (1) in which nematic liquid crystal having a positive dielectric anisotropy is sandwiched between the substrates (4) and (5); a first optical retardation compensator plate (8); a second optical retardation compensator plate (9); and a polarizer plate (10), ① the retardation of the optical retardation compensator plates (8 and 9) in the substrate normal direction, ② the angle formed by the slow axes of the optical retardation compensator plates (8 and 9) and either the transmission axis or the absorption axis of the polarizer plate (10), ③ the twist angle of the liquid crystal layer (1), ④ the product of the birefringence difference of the liquid crystal in the liquid crystal layer (1) and the thickness of the liquid crystal layer, and ⑤ the angle formed by the alignment direction of the liquid crystal molecules in a close proximity of the

substrate (4) and either the transmission axis or the absorption axis of the polarizer plate are optimized.



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(21) 国際出願番号 PCT/JP98/01348 (22) 国際出願日 1998年3月26日(26.03.98) (30) 優先権データ 特願平9/105518 1997年4月23日(23.04.97) JP (71) 出願人 (米国を除くすべての指定国について) シャープ株式会社(SHARP KABUSHIKI KAISHA)[JP/JP] 〒545-8522 大阪府大阪市阿倍野区長池町22-22 Osaka, (JP) (72) 発明者; および (75) 発明者/出願人 (米国についてのみ) 岡本正之(OKAMOTO, Masayuki)[JP/JP] 〒277-0852 千葉県柏市旭町5丁目3-32 シャープ柏寮 Chiba, (JP) 三ツ井精一(MITSUI, Seiichi)[JP/JP] 〒277-0826 千葉県柏市宿連寺228-1-202 Chiba, (JP) 佐藤 孝(SATOH, Takashi)[JP/JP] 〒632-0004 奈良県天理市櫟本町2613-1 ラポール天理746 Nara, (JP)	(74) 代理人 弁理士 原 謙三(HARA, Kenzo) 〒530-0041 大阪府大阪市北区天神橋2丁目北2番6号 大和南森町ビル 原謙三国際特許事務所 Osaka, (JP) (81) 指定国 CA, CN, JP, KR, SG, US, 欧州特許 (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). 添付公開書類 国際調査報告書	

(54) Title: REFLECTION LIQUID CRYSTAL DISPLAY AND REFLECTION LIQUID CRYSTAL DISPLAY PROVIDED WITH BUILT-IN TOUCH PANEL AND COMPRISING THE SAME

(54) 発明の名称 反射型液晶表示装置及びそれから構成されるタッチパネル一体型反射型液晶表示装置

(57) Abstract

A reflection color liquid crystal display which displays an easy-to-view multi-color image with a high contrast ratio, and a liquid crystal display having a built-in touch panel of which the displayed image is not marred even when a pressure-sensitive input unit. Specifically, a reflection liquid crystal display comprising an optically reflective plate (5), a substrate (4), a liquid crystal layer (1) having a nematic liquid crystal having positive dielectric anisotropy and sandwiched between the substrate (4) and the plate (5), a first optical phase difference compensating plate (8), a second optical phase difference compensating plate (9), and a polarizing plate (10), wherein optimization is effected regarding (i) retardation of the optical phase difference compensating plates (8, 9) in the direction normal to the substrate, (ii) the angle made by the transmission axis or absorption axis of the polarizing plate (10) and the lag axis of the optical phase difference compensating plates (8, 9), (iii) the twist angle of the liquid crystal layer (1), (iv) the product of the double refractive index difference of liquid crystal of the liquid crystal layer (1) and the thickness of the liquid crystal layer, and (v) the angle made by the direction of alienment of liquid crystal molecules near

